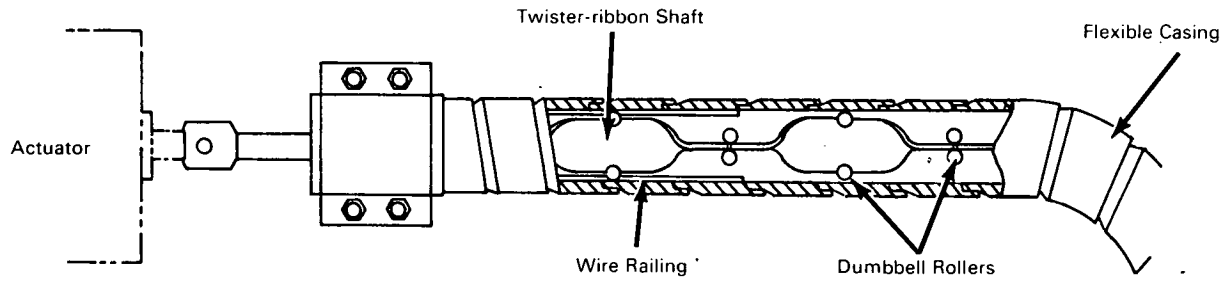
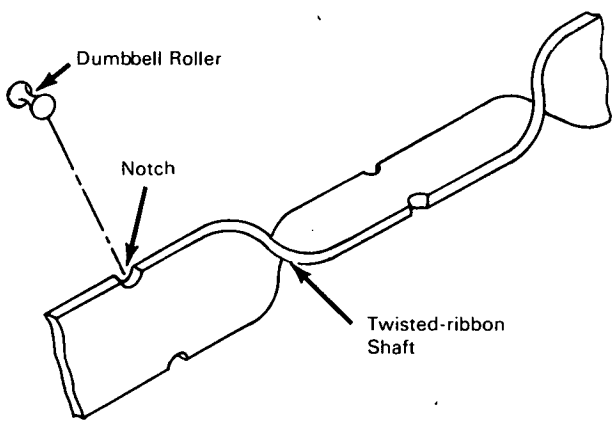
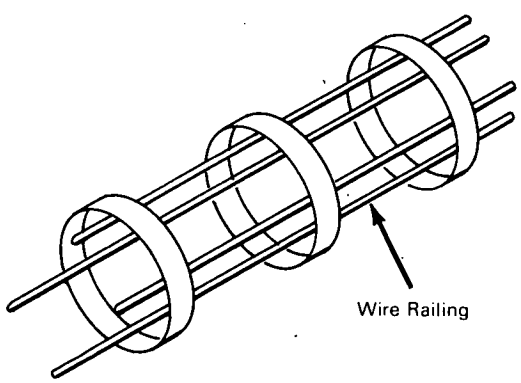
NASA TECH BRIEF

Improved Mechanical Remote Control Assembly: Concept







Excessive friction and the high stress conditions brought about by flexing make conventional push-pull mechanical remote controls inefficient. For example, a particular push-pull remote control with a round spring-wire rod as the force-transmitting shaft required an input of 625 to 650 lb to transmit 500 lb of force (input 25 percent above output) in a straight line. When the push-pull control was bent into an arc with a radius of 10 to 12 inches, input exceeded output by 30 percent.

A design concept to overcome the objectionable features of the conventional force-transmitting shaft is shown in the illustration. The force-transmitting shaft in the proposed design consists of a flat metal ribbon twisted in a configuration of paired mutually perpendicular segments. A stress analysis shows that the twisted-ribbon shaft is significantly better than the round spring-wire rod as a push-pull actuating shaft. The proposed assembly consists of four basic components: the twisted-ribbon shaft, rollers, a wire railing, and a flexible casing.

Force would be efficiently transferred around bends by the twisted-ribbon shaft, because it readily flexes without being overstressed. The shaft moves in the

(continued overleaf)

casing on dumbbell rollers, which eliminate the sliding friction that is inherent in conventional push-pull control assemblies. A dumbbell roller is seated in a central notch on each edge of the shaft segments. The notch would be made wide enough to allow back and forth sliding of the roller to prevent possible binding when the shaft is flexing in an arc. The rollers are guided by a wire railing, which provides smooth rolling surfaces over the joints of the flexible casing.

Where flexing is not needed to transfer force and motion, a semirigid conduit would be used as a casing for the push-pull control assembly. The assembly could then be simplified by eliminating the wire railing, since the wall of the conduit casing would provide a continuous surface for movement of the rollers.

Notes:

1. This development is in the conceptual stage only; as of the date of publication of this Tech Brief neither a model nor prototype has been constructed.
2. No additional documentation is available. Specific questions, however, may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B70-10144

Patent status:

No patent action is contemplated by NASA.

Source: Stephen W. Matica of
North American Rockwell Corporation
under contract to
Marshall Space Flight Center
(MFS-16249)